Evaluation of EPA Actions to Address Elevated Cancer Risks from Air Toxics Emissions from Point Sources
OA&E-FY19-0091
WP E.07.d

PURPOSE: To identify the ethylene oxide-emitting facilities that the Office of Air Quality Planning and Standards (OAQPS) had prioritized for regions to focus on.

SCOPE: Reviewed 2014 NATA and other information from EPA to identify the ethylene oxide-emitting facilities that OAQPS had prioritized for regions to focus on.

SOURCE: A) 2014 NATA v1 based on NEI v1 (point sources only) at the census block level, downloaded on 3/26/19 from OAQPS-provided temporary link (b) (6), (b) (5), (b) (3)

B) EPA, Office of Air Quality Planning and Standards, Residual Risk Report to Congress, EPA-453/R-99-001, March 1999 (https://www3.epa.gov/ttn/atw/rrisk/risk_rep.pdf, accessed 12/19/18)

C) OAQPS-identified EtO-emitting facilities as of 7/25/18 (b) (5), (b) (6), (b) (3)

D) OAQPS spreadsheet on EtO-emitting facilities contributing to cancer risks with risks determined from the draft 2014 NATA v1 and draft 2014 NATA v2 (b) (5), (b) (6), (b) (3))

E) Regional comments on the draft 2014 NATA v2 (EtO sources only) ((b) (5), (b) (6), (b) (3))

F) 2014 NATA update to emissions (https://www.epa.gov/sites/production/files/2018-08/documents/2014_nata_updates_to_emissions.pdf, accessed 9/3/19)

G) 8/21/18 email to all Air Division Directors and Deputies with a list of prioritized ethylene oxide-emitting facilities for regions to focus on.

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H) OAQPS list of the 25 prioritized ethylene oxide-emitting facilities for regions to focus on ([redacted]

I) 8/29/19 email from [redacted] stating that the correct risk contributed by Griffith Micro Science should be 100 in one million, not 200 in one million.

J) List of facilities that Region 5 is focusing on [redacted]

K) 8/28/19 email from [redacted] stating that OAQPS has not remodeled the risks that a facility contribute as a result of updated/revised emissions data.

L) Solvay now Lanxess (https://www.solvay.com/en/press-release/solvay-completes-sale-its-charleston-plant-us-and-associated-phosphorus-business, accessed 9/4/19)

M) C R Bard (now Becton, Dickinson, and Company) (https://www.bd.com/en-us/company/news-and-media/press-releases/dec-29-2017-bd-completes-bard-acquisition-creating-new-global-health-care-leader, accessed 9/419)

N) Griffith Micro Science now Sterigenics (https://www.chicagotribune.com/news/ct-sterigenics-eto-timeline-htmlstory.html, accessed 9/4/19)

O) MedPlast now Viant (https://www.medicaldesignandoutsourcing.com/viant-expands-leadership-team/, accessed 9/4/19)

P) Huntsman locations, including the Port Neches Operations location (https://www.huntsman.com/corporate/Locations?p_countryid=223, accessed 9/4/19)

Q) Region 6 list of 10 EtO-emitting facilities it's focusing on.

R) Huntsman Corporation, Conroe Facility (https://www.google.com/maps/place/5451+Jefferson+Chemical+Rd,+Conroe,+TX+77301/@30.3136563,-95.3888474,17z/data=!4m13!1m7!3m6!1s0x86474750aa4afe6f:0xa5833f0258b76ca1!2s5451+Jefferson+Chemical+Rd,+Conroe,

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+TX+77301!3b1!8m2!3d30.3137211!4d-95.3884844!3m4!1s0x86474750aa4afe6f:0xa5833f0258b76ca1!8m2!3d30.3137211!4d-95.3884844, accessed 9/4/19)

S) Akzo Nobel, Houston Plant (https://www.google.com/maps/place/15200+Almeda+Rd,+Houston,+TX+77053/@29.5844366,-95.433721,17z/data=!3m1!4b1!4m5!3m4!1s0x8640ec80033dc6f7:0x9ae9b94d5e190c81!8m2!3d29.584432!4d-95.4315323, accessed 9/4/19)

T) Huntsman Corporation, Seadrift Plant (https://www.google.com/maps/place/Union+Carbide+Corporation/@28.4158522,-96.716175,17z/data=!4m12!1m6!3m5!1s0x8669e0d3397a8f51:0x1aad61f09465878f!2sUnion+Carbide+Corporation!8m2!3d28.4154382!4d-96.7135736!3m4!1s0x8669e0d3397a8f51:0x1aad61f09465878f!8m2!3d28.4154382!4d-96.7135736, accessed 9/4/19)

U) LyondellBasell Channelview Complex (https://www.lyondellbasell.com/globalassets/lyb-around-the-world/plant-sites/fact-sheets/factsheet-channelview.pdf?id=22640, accessed 9/4/19)

V) Arkema, Inc., Clear Lake Plant (https://www.arkema-americas.com/en/arkema-americas/united-states/clear-lake-tx/, accessed 9/4/19)

W) LyondellBasell, Bayport Underwood Plant (https://www.lyondellbasell.com/en/bayport-underwood-plant/, accessed 9/4/19)

X) Follow-up with Region 5 on Cook Medical.

Y) Follow-up with Region 5 on Baxter and Christ Hospital.

Z) Google satellite map of Sterigenics in California and LyondellBasell Channelview plant (https://www.google.com/maps/place/Sterigenics+International+Inc/@33.9966502,-118.1903313,479m/data=!3m1!1e3!4m5!3m4!1s0x0:0xab27b4960464e2bb!8m2!3d33.996827!4d-118.19042 and https://www.google.com/maps/place/LyondellBasell+-+Channelview/@29.8371072,-95.1288821,4007m/data=!3m1!1e3!4m12!1m6!3m5!1s0x8640a650aa264fa3:0x39a997487bc88b3e!2sLyondellBasell+-

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+Channelview!8m2!3d29.8352836!4d-95.1118257!3m4!1s0x8640a650aa264fa3:0x39a997487bc88b3e!8m2!3d29.8352836!4d-95.1118257?hl=en, accessed 9/27/19)

(b) (5), (b) (6), (b) (3)

[redacted]

CONCLUSION: Link: Link:Link: Link:**CD** Through the 2014 NATA development and screening process, OAQPS identified areas near 56 facilities where exposure to ethylene oxide emissions causes an elevated estimated lifetime cancer risk of equal to or greater than 100 in one million, a risk level that EPA generally considers not sufficiently protective of public health. These risks are primarily driven by ethylene oxide-emitting facilities, such as commercial sterilizers and chemical manufacturing plants.

DLink:Link: Link: According to an internal EPA email (see Source G, and the corresponding attachment to that email- Source H), 25 facilities were prioritized for regions to focus on. These 25 prioritized facilities included all 22 facilities that had estimated elevated estimated lifetime cancer risk of equal to or greater than 100 in one million at the census tract level (see Details, Table 1, 6th column and title of table) and 3 of the

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34 facilities that had estimated elevated estimated lifetime cancer risk of equal to or greater than 100 in one million at the census block level (see Details, Table 2, 6th column, rows 4, 14, and 31).

DETAILS:

DETERMINING THE UNIVERSE OF ETHYLENE OXIDE EMITTING-FACILITIES CONTRIBUTING TO ELEVATED CANCER RISKS

BW Link:Link:Evaluator determined the universe of ethylene oxide-emitting facilities contributing to elevated cancer risks (i.e., 100 in one million or greater) from the 2014 NATA by:

1. Taking the 2014 NATA v1 (point sources only) at the census block level (Source A) and filtering for unique facilities contributing to cancer risks (Attachment 1 > Sheet 1 > Column T) due to ethylene oxide (Attachment 1 > Sheet 1 > Column Q). The resultant filtered sheet is shown in Attachment 1 > Sheet "Filtering for EtO". For ease of viewing the results, the resultant sheet was copied and pasted into Attachment 1 > Sheet "EtO". As shown in Attachment 1 > Sheet "EtO, there are 85 facilities (Rows 2 – 86) that emitted ethylene oxide in 2014. (Attachment 1 > Sheet "EtO" > Column T for Rows 2 – 86). One facility – Christ Hospital & Medical Center (Attachment 1 > Sheet "EtO" > Column AA for Row 87) – was not in Source A, (Evaluator conclusion based on review of Source A) but it was ultimately added in by OAQPS. (Source C > Pg. 2 of 5 > last row)

2. Given that OAQPS, regions, and states had been QA/QC'ing the draft NATA results, the evaluator then compared Attachment 1 > Sheet "EtO" with the 7/25/18 list of ethylene oxide-emitting facilities that OAQPS identified for prioritization (Source C) to determine which facilities dropped out and why. Attachment 1 > Sheet "Facilities dropping out" > Column AA shows whether a facility dropped out or not. If a facility dropped out, the evaluator determined and provided the reason in Attachment 1 > Sheet "Facilities dropping out" > Column AB. The reconciliation ultimately confirmed there are 56 ethylene oxide-emitting facilities contributing to an estimated cancer risk of 100 in one million or more that OAQPS had identified through the 2014 NATA development process. (Attachment 1 > Sheet "Facilities dropping out" > Column AA for rows 2 – 57)

Attachment 1: OIG Analysis of Sources A and C

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DETERMINING WHICH OF THE 56 ETHYLENE OXIDE-EMITTING FACILITIES WERE PRIORITIZED FOR REGIONS TO FOCUS ON

Link:BX, Link: Link: On 8/21/18 (i.e., day before 2014 NATA was released to the public), an email was sent to all Air Division Directors and Deputies containing a list of 25 facilities that OAQPS had identified from the 2014 NATA development process and prioritized for the regions to focus on. (Source G email containing the Source H list) This list contains 22 ethylene oxide-emitting facilities contributing to estimated cancer risks of 100 in one million or greater at the census tract level and 3 facilities contributing to estimated cancer risks of 100 in one million or greater at the census block level. (Source H list, which was embedded in the Source G email)

Evaluator compared the list of 56 ethylene oxide-emitting facilities contributing to estimated cancer risks of 100 in one million or greater (Attachment 1 > Sheet "Facilities dropping out" > Column AA for rows 2 – 57) with Source H to determine which ones have been prioritized. Tables 1 (census tract level with 22 facilities) and 2 [census block level (but not at census tract level) with 34 facilities] are the result of this comparison. ALink:Link:Link:As shown in Tables 1 and 2, these 56 facilities are in all EPA regions except Region 10. (Evaluator conclusion based on review of Column "EPA Region" in Tables 1 and 2)

Link:Link: Link: ELink:Link: **Table 1: List of 22 ethylene oxide-emitting facilities contributing to elevated estimated cancer risks (i.e., 100 in one million or greater) from the 2014 NATA (i.e., at the census tract level) that OAQPS prioritized for regions to focus on.**

EPA region	Facility	Location	Type of facility	Tract cancer risk (in one million) Rounded to one Significant digit	Selected for Region to focus on?
Link: Link: FLink: 2 (Source H > Cell F2) (ROW 1)	Link: Link: Edwards Lifesciences Corporation (Source H > Cell B2)	Anasco, PR (Source H > Cell D2 and E2)	Commercial sterilizer (Source C > Pg. 1 of 5 > 1st row for Edwards Lifesciences Corporation)	300 (Source H > Cell G2)	Link: Y (Source H > Row 2, see also description above on where Source H was obtained)

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G Link: Link: 3 (Source H > Cell F3) (ROW 2)	Link: Link: B Braun Medical Incorporated (Source H > Cell B3)	Allentown, PA (Source H > Cell D3 and E3)	Commercial sterilizer (Source C > Pg. 1 of 5 > 2nd row for B Braun Medical Inc.)	600 (Source H > Cell G3)	Link: Y (Source H > Row 3 see also description above on where Source H was obtained))
H Link:Link: Link: Link: 3 (Source H > Cell F5) (ROW 3)	Link: Union Carbide Corporation – Institute (Source H > Cell B5)	Institute, WV (Source H > Cell D5 and E5)	Chemical plant (Source C > Pg. 3 of 5 > 6th row for Union Carbide Institute)	400 (Source H > Cell G5)	Link: Y (Source H > Row 5 see also description above on where Source H was obtained))
I Link: Link: 3 (Source H > Cell F6) (ROW 4)	Link:Link: Croda, Incorporated (Source H > Cell B6)	New Castle, DE (Source H > Cell D6 and E6)	Chemical plant (Source C > Pg. 4 of 5 > 2nd to last row for Croda)	100 (Source H > Cell G6)	Link: Y (Source H > Row 6 see also description above on where Source H was obtained))
J Link: Link: 4 (Source H > Cell F7) (ROW 5)	Link: Link: Solvay USA, Inc. (Source H > Cell B7) (Lanxess) (Source L > 1st paragraph)	Charleston, SC (Source H > Cell D7 and E7)	Chemical plant (Source C > Pg. 5 of 5 > Table 5b > last row)	Link: 500 [a] (Source H > Cell G7)	Link: Y (Source H > Row 7 see also description above on where Source H was obtained))
K Link: Link: 4 (Source H > Cell F8) (ROW 6)	Link: Link: C R Bard (Source H > Cell B8) (Becton, Dickinson, and Company) (Source M > 1st paragraph)	Covington, GA (Source H > Cell D8 and E8)	Commercial sterilizer (Source C > Pg. 1 of 5 > 6th row for C R Bard)	200 (Source H > Cell G8)	Link: Y (Source H > Row 8 see also description above on where Source H was obtained))

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L Link: Link: 4 (Source H > Cell F9) (ROW 7)	Link: Link: Griffith Micro Science Inc (Source H > Cell B9) (Sterigenics) (Source N > description for 2004)	Smyrna, GA (Source H > Cell D9 and E9)	Commercial sterilizer (Source C > Pg. 1 of 5 > 13th row for Griffith Micro Science)	100 (Source I > Pg. 1 of 2 > 2nd paragraph)	Link: Y (Source H > Row 9 see also description above on where Source H was obtained))
M Link: Link: 5 b (Source H > Cell F11) (ROW 8)	Link: Link: Sterigenics US LLC (Source H > Cell B11)	Willowbrook, IL (Source H > Cell D11 and E11)	C Link: Commercial sterilizer (Source C > Pg. 1 of 5 > 5th row for Sterigenics in Willowbrook, IL)	300 (Source H > Cell G11)	Link: Y (Source H > Row 11 see also description above on where Source H was obtained))
N Link: Link: 5 (Source H > Cell F12) (ROW 9)	Link: Link: Medline Industries Inc Northpoint Services Division (Source H > Cell B12)	Waukegan, IL (Source H > Cell D12 and E12)	Commercial sterilizer (Source C > Pg. 1 of 5 > 10th row for Medline)	300 (Source H > Cell G12)	Link: Y (Source H > Row 12 see also description above on where Source H was obtained))
O Link: Link: 5 (Source H > Cell F13) (ROW 10)	Link: Link: Medtronic, Inc., Sterile Systems Operation (Source H > Cell B13) [Evaluator note: According to Region 5, this facility in Grand Rapids, Michigan was known as MedPlast but is now known as Viant. (Source J > Pg. 7 of 8 > 1st row)] (Viant Medical, Inc.) (Source O > 2nd paragraph)	Grand Rapids, MI (Source H > Cell D13 and E13)	Commercial sterilizer (Source C > Pg. 1 of 5 > 11th row for Metronic)	100 (Source H > Cell G13)	Link: Y (Source H > Row 13 see also description above on where Source H was obtained))
P Link: Link: 6 (Source H > Cell F14) (ROW 11)	Link:Link: BCP Ingredients Incorporated (Source H > Cell B14)	St. Gabriel, LA (Source H > Cell D14 and E14)	Chemical plant (Source C > Pg. 4 of 5 > 2nd row for BCP Ingredients in Louisiana)	2000 (Source H > Cell G14)	Link: Y (Source H > Row 14 see also description above on where Source H was obtained))

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Q Link: Link: 6 (Source H > Cell F15) (ROW 12)	Link: Link: Union Carbide Corporation, St Charles Operations (Source H > Cell B15)	Taft, LA (Source H > Cell D15 and E15)	Chemical plant (Source C > Pg. 3 of 5 > 1st row)	2000 c (Source H > Cell G15)	Link: Y (Source H > Row 15 see also description above on where Source H was obtained))
R Link: Link: 6 (Source H > Cell F16) (ROW 13)	Link: Link: Huntsman, Port Neches Operations (Source H > Cell B16 and Source P, middle of page)	Port Neches, TX (Source H > Cell D16 and E16)	Chemical plant (Source C > Pg. 3 of 5 > 2nd row)	300 (Source H > Cell G16)	Link: Y (Source H > Row 16 see also description above on where Source H was obtained))
S Link: 6 (Source H > Cell F17) (ROW 14)	Link: Link: Eastman Chemical Texas Operations (Source H > Cell B17 and Source Q > table > 4th row for Eastman Chemical TX operations)	Longview, TX (Source H > Cell D17 and E17)	Chemical plant (Source C > Pg. 3 of 5 > 3rd row)	200 (Source H > Cell G17)	Link: Y (Source H > Row 1 see also description above on where Source H was obtained)7)
T Link: 6 (Source H > Cell F18) (ROW 15)	Link: Link: Taminco US Inc (Source H > Cell B18) (Eastman Corporation) (Source Q > table > 5th row for Taminco)	St. Gabriel, LA (Source H > Cell D18 and E18)	Chemical plant (Source C > Pg. 4 of 5 > 4th row)	200 (Source H > Cell G18)	Link: Y (Source H > Row 18 see also description above on where Source H was obtained))
U Link: 6 (Source H > Cell F19) (ROW 16)	Link: Link: Sasol Chemicals (USA) LLC - Lake Charles Chemical Complex (Source H > Cell B19)	Westlake, LA (Source H > Cell D19 and E19)	Chemical plant (Source C > Pg. 3 of 5 > 5th row)	100 (Source H > Cell G19)	Link: Y (Source H > Row 19 see also description above on where Source H was obtained))
V Link: 6 (Source H > Cell F20) (ROW 17)	Link: Link: Air Products Performance Manufacturing Inc - Reserve Plant (Evonik Materials Corporation) (Source H > Cell B20)	Reserve, LA (Source H > Cell D20 and E20)	Chemical plant (Source C > Pg. 4 of 5 > 3rd row)	100 (Source H > Cell G20)	Link: Y (Source H > Row 20 see also description above on where Source H was obtained))

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W Link: 6 (Source H > Cell F22) (ROW 18)	Link: Link: Midwest Sterilization Corporation (Source H > Cell B22)	Laredo, TX (Source H > Cell D22 and E22)	Commercial sterilizer (Source C > Pg. 1 of 5 > 14th row)	100 (Source H > Cell G22)	Link: Y (Source H > Row 22) see also description above on where Source H was obtained)
X Link: 6 (Source H > Cell F21) (ROW 19)	Link: Link: Shell Technology Center Houston (Source H > Cell B21)	Houston, TX (Source H > Cell D21 and E21)	Chemical plant (Source C > Pg. 4 of 5 > 10th row)	300 (Source H > Cell G21)	Link: Y (Source H > Row 21 see also description above on where Source H was obtained))
Y Link: 6 (Source H > Cell F23) (ROW 20)	Link: Link: Sterigenics Santa Teresa Facility (Source H > Cell B23 and Source Q > table > last row)	Santa Teresa, NM (Source H > Cell D23 and E23)	Commercial sterilizer (Source C > Pg. 1 of 5 > 16th row)	200 d (Source H > Cell G23)	Link: Y (Source H > Row 23 see also description above on where Source H was obtained))
Z Link: 7 (Source H > Cell F25) (ROW 21)	Link: Link: Midwest Sterilization Corporation (Source H > Cell B25)	Jackson, MO (Source H > Cell D25 and E25)	Commercial sterilizer (Source C > Pg. 1 of 5 > 3rd row)	200 (Source H > Cell G25)	Link: Y (Source H > Row 25 see also description above on where Source H was obtained))
AA Link: 8 (Source H > Cell F26) (ROW 22)	Link: Link: Terumo BCT Sterilization Services, Incorporated (Source H > Cell B26)	Lakewood, CO (Source H > Cell D26 and E26)	Commercial sterilizer (Source C > Pg. 1 of 5 > 4th row)	500 (Source H > Cell G26)	Link: Y (Source H > Row 26 see also description above on where Source H was obtained))

AB Link: [a] Risk is based on new information received since ~~the release of~~ conducting the 2014 NATA. (Source H > Row 31. (b) (5), (b) (6), (b) (3) [redacted] The Source H spreadsheet was also attached to the Source G email. We know that the Solvay risk was changed to 500 in one million because it was originally 100 in one million when development of the 2014 NATA began. See the 100 in one million risk in Source C > Pg. 5 of 5 > last row.)

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[b] **B**Link: Link:Link: Link:In addition to the facilities EPA regions are focusing on, Region 5 is also focusing on Vantage Specialty Chemicals in Gurnee, IL, (Source J > Pg. 6 of 8 > Row for Vantage) which was not modeled as part of the 2014 NATA because of an error in the National Emissions Inventory. (Source F > Pg. 2 and 3 of 3 > last bullet point)

ACLink: [c] According to the EPA, the facility revised its 2014 emissions data after the publication of the 2014 NATA, (Source F > Pg. 3 of 3 > 2nd bullet point) but the EPA has not remodeled the facility's health risks. (Source K. Please note that the list of facilities with 2014 NATA emissions updates as of June 27, 2019 that was provided to [redacted] for review was Source F, see page 3 for Union Carbide, St. Charles Operations.)

ADLink: [d] According to the EPA, the facility installed a control device and has reduced emissions by 83 percent between 2014 and 2016, (Source F > Pg. 1 of 3 > 2nd to last bullet point) but the EPA has not remodeled the facility's health risks. (Source K. Please note that the list of facilities with 2014 NATA emissions updates as of June 27, 2019 that was provided to [redacted] for review was Source F, see page 1)

Link:Link: Link: Link:Link: Link: **WP E.08.b - Rulemaking efforts to address the 25 high-priority facilities.docxTable 2:** Link: **BY** Link:

List of 34 ethylene oxide-emitting facilities contributing to elevated estimated cancer risks (i.e., 100 in one million or greater) at the census block level but not at the census tract level, as identified by OAQPS, and whether OAQPS prioritized any of them for regions to focus on. Please note that just like the census tract level cancer risks reported in Table 1, census block level cancer risks are also reported with one significant figure because of uncertainties involved in determining these cancer risks (See WP H.02.a1 > Details section > Questions 2 and 3)

BZLink: **Please also note that Some of the 34 facilities may be in isolated areas or industrial parks and therefore emissions may not impact a significant number of people. (Evaluator conclusion based on Google satellite map of Sterigenics in California and LyondellBasell Channelview Plant – See Source Z for the satellite maps) Also, some of these facilities may have ceased processes involving ethylene oxide, ~~closed,~~ or reduced emissions since 2018 when the 34 facilities were identified. (For example, see Footnotes b, c, d, and e)**

Note: For details on how Source C was verified, see BW and BX above.

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EPA region	Facility	Location	Type of facility	Census block level cancer risk (in one million) (rounded to one significant digit)	Selected for Region to focus on?
AE Link: 1 (Source C > Pg. 1 of 5 > 3rd to last row) (ROW 1)	Link: Covidien LP (formerly U.S. Surgical Corp./Tyco Healthcare Group) (Source C > Pg. 1 of 5 > 3rd to last row and Attachment 1 > Sheet "EtO" > Cell F9)	New Haven, CT (Source C > Pg. 1 of 5 > 3rd to last row)	Commercial sterilizer (Source C > Pg. 1 of 5 > 3rd to last row)	100 (Source D > Cell H55)	N (Evaluator conclusion based on review of Source H)
AF Link: 2 (Source C > Pg. 4 of 5 > last row) (ROW 2)	Link: Ashland Specialty Ingredients (Source C > Pg. 4 of 5 > last row)	Parlin, NJ (Source C > Pg. 4 of 5 > last row)	Chemical plant (Source C > Pg. 4 of 5 > last row)	100 (Source D > Cell H58)	N (Evaluator conclusion based on review of Source H)
AG Link: 3 (Source C > Pg. 3 of 5 > 3rd to last row) (ROW 3)	Link: Bayer Material Science – South Charleston (Source C > Pg. 3 of 5 > 3rd to last row)	South Charleston, WV (Source C > Pg. 3 of 5 > 3rd to last row)	Chemical plant (Source C > Pg. 3 of 5 > 3rd to last row)	200 (Source D > Cell H49)	N (Evaluator conclusion based on review of Source H)
AH Link: Link: 3 (Source C > Pg. 3 of 5 > 4th row) (ROW 4)	Link: Link: Union Carbide Corporation – South Charleston Facility (Source C > Pg. 3 of 5 > 4th row and Source D, Cell B15)	South Charleston, WV (Source C > Pg. 3 of 5 > 4th row)	Chemical plant (Source C > Pg. 3 of 5 > 4th row)	CA Link: Link: Link: 1000 (Source D > Cell H15)	Link: Y (Source H > Row 4)
AI Link: 4 (Source C > Pg. 4 of 5 > 6th row) (ROW 5)	Link: Stepan Company (Source C > Pg. 4 of 5 > 6th row)	Winder, GA (Source C > Pg. 4 of 5 > 6th row)	Chemical plant (Source C > Pg. 4 of 5 > 6th row)	700 (Source D > Cell H23)	N (Evaluator conclusion based on review of Source H)

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AJ Link: **4** (Source C > Pg. 2 of 5 > 2nd row) **(ROW 6)**	Link: Frye Regional Medical Center (Source C > Pg. 2 of 5 > 2nd row)	Hickory, NC (Source C > Pg. 2 of 5 > 2nd row)	Hospital sterilizer (Source C > Pg. 2 of 5 > 2nd row)	700 (Source D > Cell H25)	N (Evaluator conclusion based on review of Source H)
AK Link: **4** (Source C > Pg. 1 of 5 > 7th row) **(ROW 7)**	Link: Kendall Healthcare Products (Source C > Pg. 1 of 5 > 7th row)	Augusta, GA (Source C > Pg. 1 of 5 > 7th row)	Commercial sterilizer (Source C > Pg. 1 of 5 > 7th row)	700 (Source D > Cell H26)	N (Evaluator conclusion based on review of Source H)
AL Link: **4** (Source C > Pg. 1 of 5 > 12th row) **(ROW 8)**	Link: International Sterilization Laboratory (Source C > Pg. 1 of 5 > 12th row)	Groveland, FL (Source C > Pg. 1 of 5 > 12th row)	Commercial sterilizer (Source C > Pg. 1 of 5 > 12th row)	200 (Source D > Cell H41)	N (Evaluator conclusion based on review of Source H)
AM Link: **4** (Source C > Pg. 4 of 5 > 3rd to last row) **(ROW 9)**	Link: BASF Whitestone Plant (Source C > Pg. 4 of 5 > 3rd to last row)	Whitestone, SC (Source C > Pg. 4 of 5 > 3rd to last row)	Chemical plant (Source C > Pg. 4 of 5 > 3rd to last row)	200 (Source D > Cell H43)	N (Evaluator conclusion based on review of Source H)
AN Link: **4** (Source C > Pg. 2 of 5 > 4th row) **(ROW 10)**	Link: FirstHealth Moore Regional Hospital (Source C > Pg. 2 of 5 > 4th row)	Pinehurst, NC (Source C > Pg. 2 of 5 > 4th row)	Hospital sterilizer (Source C > Pg. 2 of 5 > 4th row)	200 (Source D > Cell H47)	N (Evaluator conclusion based on review of Source H)
AO Link: **4** (Source C > Pg. 1 of 5 > 5th to last row) **(ROW 11)**	Link: Sterigenics U.S. LLC (Source C > Pg. 1 of 5 > 5th to last row)	Charlotte, NC (Source C > Pg. 1 of 5 > 5th to last row)	Commercial sterilizer (Source C > Pg. 1 of 5 > 5th to last row)	200 (Source D > Cell H50)	N (Evaluator conclusion based on review of Source H)

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AP Link: **4** (Source C > Pg. 2 of 5 > 3rd to last row) **(ROW 12)**	Link: Veterans Affairs Medical Hospital (Source C > Pg. 2 of 5 > 3rd to last row)	Durham, NC (Source C > Pg. 2 of 5 > 3rd to last row)	Hospital sterilizer (Source C > Pg. 2 of 5 > 3rd to last row)	100 (Source D > Cell H52)	N (Evaluator conclusion based on review of Source H)
AQ Link: **4** (Source C > Pg. 3 of 5 > last row) **(ROW 13)**	Link: Monument Chemical Kentucky LLC (Source C > Pg. 3 of 5 > last row)	Brandenburg, KY (Source C > Pg. 3 of 5 > last row)	Chemical plant (Source C > Pg. 3 of 5 > last row)	100 (Source D > Cell H62)	N (Evaluator conclusion based on review of Source H)
AR Link: Link: **5** (Source C > Pg. 4 of 5 > 3rd row) **(ROW 14)**	Link: Link: Air Products Performance MFG Inc. (Source C > Pg. 4 of 5 > 3rd row) (Evonik) (Source J > Pg. 5 of 8 > 1st row)	Milton, WI (Source C > Pg. 4 of 5 > 3rd row)	Chemical plant (Source C > Pg. 4 of 5 > 3rd row)	**CB** Link: Link: Link: 2000 (Source D > Cell H6)	Link: Y (Source H > Row 10)
AS Link: **5** (Source C > Pg. 4 of 5 > 8th row) **(ROW 15)**	Link: Pelron Corporation (Source C > Pg. 4 of 5 > 8th row) (Ele) (Source J > Pg. 7 of 8 > 2nd row)	McCook, IL (Source J > Pg. 7 of 8 > 2nd row) (Note: Lyons is listed in Source C. McCook and Lyons are located next to each other.)	Chemical plant (Source C > Pg. 4 of 5 > 8th row)	600 [a] (Source D > Cell H29)	N (Evaluator conclusion based on review of Source H)
AT Link: **5** (Source C > Pg. 1 of 5 > 8th row) **(ROW 16)**	Link: Cook Medical (Source J > Pg. 7 of 8 > last row) Note: Source C shows Cook, Inc.	Ellettsville, IN (Source C > Pg. 1 of 5 > 8th row)	Commercial sterilizer (Source C > Pg. 1 of 5 > 8th row)	500 [b] (Source D > Cell H30)	N (Evaluator conclusion based on review of Source H)

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AU Link: **5** (Source C > Pg. 2 of 5 > last row) **(ROW 17)**	Link: Christ Hospital and Medical Center (Source C > Pg. 2 of 5 > last row)	Oak Lawn, IL (Source C > Pg. 2 of 5 > last row)	Hospital sterilizer (Source C > Pg. 2 of 5 > last row)	100 [c] (Source D > Cell H61)	N (Evaluator conclusion based on review of Source H)
AV Link: **5** (Source C > Pg. 1 of 5 > last row) **(ROW 18)**	Link: Baxter Healthcare Corp. (Source C > Pg. 1 of 5 > last row)	Round Lake, IL (Source C > Pg. 1 of 5 > last row)	Commercial sterilizer (Source C > Pg. 1 of 5 > last row)	100 [d] (Source D > Cell H63)	N (Evaluator conclusion based on review of Source H)
AW Link: **5** (Source C > Pg. 2 of 5 > 2nd to last row) **(ROW 19)**	Link: St. Elizabeth Hospital (Source C > Pg. 2 of 5 > 2nd to last row)	Belleville, IL (Source C > Pg. 2 of 5 > 2nd to last row)	Hospital sterilizer (Source C > Pg. 2 of 5 > 2nd to last row)	100 [e] (Source D > Cell H59)	N (Evaluator conclusion based on review of Source H)
AX Link: **6** (Source C > Pg. 3 of 5 > 7th row) **(ROW 20)**	Link: Huntsman Corporation, (Source R > Pg. 2 showing Huntsman Corporation) Conroe Facility (Source C > Pg. 3 of 5 > 7th row)	Conroe, TX (Source C > Pg. 3 of 5 > 7th row)	Chemical plant (Source C > Pg. 3 of 5 > 7th row)	700 [f] (Source D > Cell H22)	N (Evaluator conclusion based on review of Source H)
AY Link: **6** (Source C > Pg. 4 of 5 > 7th row) **(ROW 21)**	Link: Akzo Nobel, (Source S > Pg. 2 of 2) Houston Plant (Source C > Pg. 4 of 5 > 7th row)	Houston, TX (Source C > Pg. 4 of 5 > 7th row)	Chemical plant (Source C > Pg. 4 of 5 > 7th row)	600 [g] (Source D > Cell H27)	N (Evaluator conclusion based on review of Source H)

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AZ Link: **6** (Source C > Pg. 3 of 5 > 9th row) **(ROW 22)**	Link: Union Carbide Corp. (Source T) Seadrift Plant (Source C > Pg. 3 of 5 > 9th row)	Seadrift, TX (Source C > Pg. 3 of 5 > 9th row)	Chemical plant (Source C > Pg. 3 of 5 > 9th row)	400 (Source D > Cell H31)	N (Evaluator conclusion based on review of Source H)
BA Link: **6** (Source C > Pg. 1 of 5 > 9th row) **(ROW 23)**	Link: Baxter Healthcare Corporation (Source C > Pg. 1 of 5 > 9th row)	Mountain Home, AR (Source C > Pg. 1 of 5 > 9th row)	Commercial sterilizer (Source C > Pg. 1 of 5 > 9th row)	300 (Source D > Cell H33)	N (Evaluator conclusion based on review of Source H)
BB Link: **6** (Source C > Pg. 3 of 5 > 5th to last row) **(ROW 24)**	Link: BASF Corp. – Geismar Site (Source C > Pg. 3 of 5 > 5th to last row)	Geismar, LA (Source C > Pg. 3 of 5 > 5th to last row)	Chemical plant (Source C > Pg. 3 of 5 > 5th to last row)	300 (Source D > Cell H39)	N (Evaluator conclusion based on review of Source H)
BC Link: **6** (Source C > Pg. 3 of 5 > 4th to last row) **(ROW 25)**	Link:LyondellBasell, (Source U) Channelview Plant (Source C > Pg. 3 of 5 > 4th to last row)	Channelview, TX (Source C > Pg. 3 of 5 > 4th to last row)	Chemical plant (Source C > Pg. 3 of 5 > 4th to last row)	200 (Source D > Cell H48)	N (Evaluator conclusion based on review of Source H)
BD Link: **6** (Source C > Pg. 3 of 5 > 2nd to last row) **(ROW 26)**	Link: Dow Chemical Co. – Louisiana Operations (Source C > Pg. 3 of 5 > 2nd to last row)	Plaquemine, LA (Source C > Pg. 3 of 5 > 2nd to last row)	Chemical plant (Source C > Pg. 3 of 5 > 2nd to last row)	100 (Source D > Cell H60)	N (Evaluator conclusion based on review of Source H)

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BE Link: **6** (Source C > Pg. 3 of 5 > 7th to last row) **(ROW 27)**	Link: Arkema Inc. (Source V > bottom of page) Clear Lake Plant (Source C > Pg. 3 of 5 > 7th to last row)	Pasadena, TX (Source C > Pg. 3 of 5 > 7th to last row)	Chemical plant (Source C > Pg. 3 of 5 > 7th to last row)	300 (Source D > Cell H35)	N (Evaluator conclusion based on review of Source H)
BF Link: **6** (Source C > Pg. 3 of 5 > 6th to last row) **(ROW 28)**	Link: LyondellBasell, (Source W) Bayport Underwoood Plant (Source C > Pg. 3 of 5 > 6th to last row)	Pasadena, TX (Source C > Pg. 3 of 5 > 6th to last row)	Chemical plant (Source C > Pg. 3 of 5 > 6th to last row)	300 (Source D > Cell H36)	N (Evaluator conclusion based on review of Source H)
BG Link: **6** (Source C > Pg. 3 of 5 > 8th row) **(ROW 29)**	Link: Shell Chemical LP – Geismar Plant (Source C > Pg. 3 of 5 > 8th row)	Geismar, LA (Source C > Pg. 3 of 5 > 8th row)	Chemical plant (Source C > Pg. 3 of 5 > 8th row)	600 (Source D > Cell H28)	N (Evaluator conclusion based on review of Source H)
BH Link: **7** (Source C > Pg. 4 of 5 > 5th to last row) **(ROW 30)**	Link: Penford Products Co. (Source C > Pg. 4 of 5 > 5th to last row)	Cedar Rapids, IA (Source C > Pg. 4 of 5 > 5th to last row)	Chemical plant (Source C > Pg. 4 of 5 > 5th to last row)	400 (Source D > Cell H32)	N (Evaluator conclusion based on review of Source H)
BI Link: **7** (Source C > Pg. 4 of 5 > 1st row) **(ROW 31)**	Link: Link: BCP Ingredients – Verona Plant (Source C > Pg. 4 of 5 > 1st row)	Verona, MO (Source C > Pg. 4 of 5 > 1st row)	Chemical plant (Source C > Pg. 4 of 5 > 1st row)	**CC** Link: Link: Link: 9000 (Source D > Cell H2)	Link: Y (Source H > Row 24)
BJ Link: **8** (Source C > Pg. 2 of 5 > 1st row) **(ROW 32)**	Link: North Colorado Medical Center (Source C > Pg. 2 of 5 > 1st row)	Greeley, CO (Source C > Pg. 2 of 5 > 1st row)	Hospital sterilizer (Source C > Pg. 2 of 5 > 1st row)	800 (Source D > Cell H20)	N (Evaluator conclusion based on review of Source H)

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BK Link: **8** (Source C > Pg. 2 of 5 > 3rd row) **(ROW 33)**	Link: Community Hospital (Source C > Pg. 2 of 5 > 3rd row)	Grand Junction, CO (Source C > Pg. 2 of 5 > 3rd row)	Hospital sterilizer (Source C > Pg. 2 of 5 > 3rd row)	300 (Source D > Cell H40)	N (Evaluator conclusion based on review of Source H)
BL Link: **9** (Source C > Pg. 1 of 5 > 2nd to last row) **(ROW 34)**	Link: Sterigenics U.S. Inc. (Source C > Pg. 1 of 5 > 2nd to last row)	Los Angeles, CA (Source C > Pg. 1 of 5 > 2nd to last row)	Commercial sterilizer (Source C > Pg. 1 of 5 > 2nd to last row)	100 (Source D > Cell H56)	N (Evaluator conclusion based on review of Source H)

BM Link:[a] According to the EPA, the facility revised its 2014 emissions data after publication of the 2014 NATA and provided modeling parameters to the EPA, (Source F > Pg. 2 of 3 > 2nd to last bullet point) but the EPA has not remodeled the facility's health risks. (Source K. Please note that the list of facilities with 2014 NATA emissions updates as of June 27, 2019 that was provided to [redacted] for review was Source F, p. 2 (Ele))

BN Link:[b] According to Region 5, the facility plans to reduce emissions significantly by operating under permanent total enclosure conditions by the end of 2019. (Source X)

BO Link:[c] According to Region 5, Illinois stated that the facility ceased processes involving ethylene oxide as of March 2019. (Source Y)

BP Link:[d] According to Region 5, the facility ceased processes involving ethylene oxide as of April 2019. (Source Y)

BQ Link:[e] According to Region 5, the facility moved to O'Fallon, IL and no longer uses ethylene oxide sterilization at its new location. (Source E > Cell T69. Please note that Source E came from Region 5 in an 8/26/19 email. This 8/26/19 email is Source AA. If you open up the Source AA email and then open the attachment in the email, you'll see that the spreadsheet had been filtered for Region 5, and Column T are Region 5's notes. We know that Column T in this spreadsheet in the Source AA email are Region 5's notes because the original spreadsheet sent to the regions (see spreadsheet attachment in Source AB email) did not contain these Region 5 notes that are in the spreadsheet in the Source AA email. Evaluator had forgotten about these Region 5 notes in the attachment in the Source AA email (Source AC) and sent Region 5 an email about St. Elizabeth Hospital, which Region 5 responded – see Source AD for that email response.)

[f] According to the EPA, the facility indicated it reported its 2.62 tons of ethylene oxide for 2014, not the 2.6693 tons that are in the 2014 NEI. (Source F > Pg. 3 of 3 > last bullet point)

[g] According to the EPA, the facility revised its 2014 emissions data after publication of the 2014 NATA. (Source F > Pg. 3 of 3 > 2nd to last bullet point)

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BR Link:Link:Link:As shown in Table 1, the 2014 NATA identified 22 ethylene oxide-emitting facilities contributing to estimated cancer risks of 100 in one million or greater at the census tract level. BS Link:Eleven of the 22 are facilities that sterilize medical equipment (Table 1 in this WP > the 11 rows identified as "commercial sterilizers") and 11 are chemical plants. (Table 1 in this WP > the 11 rows identified as "chemical plants") As shown in Table 2, EPA identified an additional 34 ethylene oxide-emitting facilities contributing to estimated cancer risks of equal to or greater than 100 in one million at the census block level. (Table 2 in this WP) BT Link:The estimated risks calculated for a census block can be higher than the overall risk for the census tract. (See Source D > Column H block level risk, which is consistently higher than the Column J tract level risk) BV Link:Link: When risk is considered at both the census tract and block levels, there are a total of 56 ethylene oxide-emitting facilities contributing to elevated estimated cancer risks equal to or greater than 100 in one million, (22 + 34 = 56) a risk level that EPA generally considers not sufficiently protective of public health (Note: Or can be viewed as unacceptable). (Source B > Pg. 26 of 225 > phrase that begins "an MIR (maximum individual risk) of approximately 1 in 10 thousand should ordinarily...") These risks, which nearby residents face, are primarily driven by ethylene oxide-emitting facilities, such as commercial sterilizers, which are facilities that sterilize medical equipment, and chemical manufacturing plants as shown in Tables 1 and 2. BU Link: Since the 34 facilities at the census block level were identified in 2018, there is a possibility that some of them have changed their operating processes or no longer emit ethylene oxide ~~or are no longer in business~~. (For example, see Table 2 > Footnotes b, c, d, and e.)

Reviewer Comment (and Date of Review)	Team Response (and Date of Response)	Resolution (and Date of Resolution)
(b) (5) [redacted]	(b) (5) [redacted] BC, 9/23/19	WP is approved. RML 9/24/2019

Prepared by:	Date
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Renee McGhee-Lenart	9/24/2019